

found his bee went to the blue glass *first* thirty-one times, and *last* only four times, while the plain glass came in for first notice only five times, and last twenty-four times. The other colours occupied intermediate positions in the bee's favour.

Here we have a case of which the bee could not possibly have had previous experience, and where every precaution was taken to avoid any undue advantage of position, &c., being given to any particular colour, with a result going far to prove that all other conditions being alike, colour does play an important part in deciding an insect's choice.

I would suggest that the correct method of settling the question would be to cut away, not the petals, but the stamens, &c. Then if insects continued to visit flowers so mutilated we should have grounds for thinking that petals exercise some attraction, or *vice versa*.

E. ERNEST LOWE.

Municipal Museum and Art Gallery, Plymouth,
February 9.

Science and the Education Act of 1902.

In two letters to you last year, I drew the attention of scientific men and of others interested in the welfare of our country and empire to the inferior position which scientific studies continue to hold in the education of the youth of this country (see NATURE, vol. lxvi. pp. 350, 459). One hoped that the Education Act of 1902 would do something to remedy present defects. That hope, it is to be feared, is in a poor way of being realised, so far as any inference can be drawn from the composition of the "Education Committee" recently appointed by the Council of a county so near to the metropolis as Hertfordshire. The whole thing is little better than a jumble, the sort of thing one would expect from the manipulation of a county-directory in a solicitor's office. So little did the County Council appear from the newspaper report to realise the gravity of the task before them that they adopted *en bloc* and without criticism the list prepared for them by the Clerk of the Peace, whose first-hand knowledge of education can only be at the best extremely limited. The committee-list bristles with names of county respectability, including a noble earl, a few M.P.'s, a fair sprinkling of J.P.'s, and among the C.C.'s elected very few appear to have taken a degree at any university, while one solitary name appears as a representative of science in that of Sir John Evans, F.R.S., who might have been a little more vigilant in this matter.

Outside the Council, we find the name of the Dean of St. Albans, a scholarly, clear-sighted, large-minded man, an acquisition to any committee; then the names of the two classical head-masters of Haileybury and Berkhamstead, men of the type referred to in my previous letters (*supra*), who cannot be expected to appreciate the importance of scientific education, but whose position in the educational world will give adventitious value to their opinions among the rank and file of the educational ignoramus. In a list of some twenty-one, one solitary name, that of the young head-master of a not very important school in this neighbourhood, appears as a representative of science. It does not appear that a single representative of the Army or Navy or a single graduate in science or medicine finds a place on the committee; and such men resident in the county as my neighbour the principal of the Diocesan Training College (who is zealously engaged in attempting to train elementary teachers on scientific lines), or the official secretary of University College, or myself (with a record of more than a quarter of a century of public-school and scientific work) seem to have been the last people to be thought of.

In the light of the above facts, can it be unfair to say that the cause of progressive education in the county of Herts has drifted? And if this can happen in a county so near London, what is likely to happen in the more remote counties, where provincial ideas prevail more strongly? Is it not time that the leading scientific societies, led by the Royal Society or by the British Association, should draw up a memorandum impressing upon the county and borough councils of the country the serious call made to them by the Education Act to do their best to strengthen the sinews of the intellectual war, which (*nolens volens*) this country must be prepared to carry on? Had there been a single man of light and leading in the Cabinet, such instructions might have been included in the Act

or its preamble as to render such action unnecessary. But so-becloaked were the minds of our legislators in the long, dreary strife of bigotry and partisanship of last autumn that they seem to have lost sight of higher intellectual issues altogether. Let us hope that in the great provincial centres such an important point as the due representation of scientific education on the educational committees will not be lost sight of. A. IRVING.

Hockerill, Bishop's Stortford, February 6.

RADIO-ACTIVITY OF ORDINARY MATERIALS.

IT is now well recognised that the air in any ordinary vessel possesses the power of conducting electricity, although to a very slight extent. It has been usual to refer to the effect as the "spontaneous ionisation" of the air. This name suggests that the conductivity is in some way an essential property of the air, just as the electrical conductivity of metals is inseparably connected with the nature of those bodies. Mr. C. T. R. Wilson, however, has found (Proc. Roy. Soc., vol. lxix. p. 277) that, when other gases are substituted for air, the relative ionisations are in nearly the same ratio as those which I observed for the same gases under the action of Becquerel radiation (Phil. Trans., 1901, p. 507). Further, Mr. J. Patterson (Proc. Camb. Phil. Soc., vol. xii. p. 44) has found that, when a large-vessel is used, the amount of ionisation is not proportional to the pressure, but tends towards a limit, when further increase of pressure no longer affects it. This is exactly the behaviour that might be expected if the effect was due to a feeble radio-activity of the walls of the vessel, the radiation being easily absorbed by the air.

I have recently carried out a series of experiments with a view to decide whether the nature of the walls of the vessel had any influence on the rate of discharge of a charged body inside it.

The various materials were made into cylinders, 13 cm. long and 3'4 cm. in diameter. A central wire, charged, and connected with an electroscope, formed the leaking system. The electroscope was exhausted, so as to avoid any leakage through the air in it, and, before each experiment, the insulation, which was of lead-glass tube, dried by the exhaustion of the vessel in presence of phosphoric anhydride, was tested. No leakage could be detected. On admitting dried air, a small leakage immediately set in, and its amount could be measured by timing the movement of the gold leaf over the scale division of a microscope with micrometer eyepiece focussed upon the leaf.

The leakage in scale divisions per hour, with various materials surrounding the charged wire, is given below :

Tin foil	...	...	...	...	...	...	3'3
Ditto, another sample	...	...	...	...	...	...	2'3
Glass coated with phosphoric acid	...	...	...	...	...	...	1'3
Silver, chemically deposited on glass	...	...	...	...	...	...	1'6
Zinc	...	...	...	...	...	...	1'2
Lead	...	...	...	...	...	...	2'2
Copper (clean)	...	...	...	...	...	...	2'3
Ditto, thoroughly oxidised	...	...	...	...	...	...	1'7
Platinum (various samples)	...	...	...	...	...	...	2'0, 2'9, 3'9
Aluminium	...	...	...	...	...	...	1'4

It appears, then, that there are very marked differences in the rate of the leak, when different materials constitute the walls of the vessel. There can therefore be little doubt that the greater part—if not the whole—of the observed ionisation of air is not spontaneous at all, but due to Becquerel rays from the vessel.

It is, I think, interesting to find that the phenomena of radio-activity, which have generally been regarded as rare and exceptional, are really everywhere present.

The rate of leak with various pieces of tin foil from the same stock was always the same, as nearly as the experiments could show—that is, to within about 6 per

cent. But, as may be seen in the table, a piece from another stock gave a different amount of leakage. The same holds good for platinum, one specimen tried being twice as active as another. It was found that ignition did not affect the radio-activity of a given specimen of platinum.

In order to compare the activity of the substances mentioned above with that of uranium, a small crystal of uranium nitrate, measuring 12×4 mm., was cemented to the inside of one of the cylinders; the rate of leak due to it was found to be thirteen times that due to the most active cylinder of platinum. The area of the uranium was only $1/240$ th part that of the platinum, so that its activity for an equal area would be no less than 3000 times greater. It is possible that the radio-activity of ordinary materials may be due to traces of the more active substances. This would explain the varying activities of different samples of the same metal. Only an infinitesimal proportion of radium would be required. Radium is 100,000 times more active than uranium, and uranium 3000 times more active than the most active common material that I have experimented with. So that one part of radium in three hundred million would suffice to account for the observed effects.

R. J. STRUTT.

OYSTERS AND TYPHOID FEVER.

THE recent outbreaks of typhoid fever at Winchester and at Southampton have again directed public attention to the risk of typhoid infection due to the laying down of edible forms of shell-fish in sewage-polluted waters.

So long ago as 1895, in a report made by Dr. Bulstrode to the Local Government Board, it was pointed out that few of the oyster layings, fattening beds or storage ponds round the English and Welsh coasts could be regarded as free from possible sewage contamination. In consequence of this report, the Local Government Board in 1899 introduced a Bill providing that the various county and borough councils should ascertain from time to time the sanitary conditions of the oyster layings and empowering these bodies to take action if sewage pollution were proved. This Bill, which dealt only with oysters, after having been read a second time, was withdrawn. Apparently nothing has since been done, matters have been allowed to drift, and in consequence several outbreaks of disease have occurred, with loss of valuable lives, and an important industry is threatened with temporary ruin.

In 1901, the medical officer of health for Westminster reported on certain cases of typhoid fever seemingly due to contaminated cockles, from some of which a bacillus, having all the characters of the typhoid bacillus, was isolated at the Jenner Institute of Preventive Medicine.

Dr. Nash, the medical officer of health for Southend-on-Sea, reported upon the incidence of typhoid fever in that borough during 1901, and found that in no less than twenty-one out of thirty-seven cases of the disease there was a history of the eating of shell-fish (generally oysters and cockles) within a month of the onset of the disease, i.e. within the incubation period. From a report by Dr. Allan, medical officer of health for the City of Westminster, mussels also seem to be implicated.

Attacks of illness, attributable to the eating of shell-fish, in the Borough of Wandsworth and the City of Westminster having been brought to the notice of the Corporation of the City of London, the last-named body has taken action. The responsibility of the City Corporation in this matter is great, for not only are the majority of the cockles and many of the oysters implicated exposed for sale in the City, but the former shell-fish is mostly obtained and relaid within the City's

jurisdiction. The City Corporation has therefore caused a number of samples to be bacterioscopically examined by Dr. Klein, and his reports show that a larger or smaller proportion of the samples examined from every district shows evidence of sewage contamination, and from certain cockles the typhoid bacillus has actually been isolated.

The question then arose as to dealing with an obviously infected and dangerous source of food supply. Under the Public Health (London) Act 1891, it is possible to obtain a justice's order to destroy such unwholesome food, but the necessary examination to establish the fact involves a lapse of several days, and before the results of such examination could be known, the whole quantity of the sample implicated would have been consumed. In the circumstances, the facts were reported to the Worshipful Company of Fishmongers, which has extensive powers over the fishing industry throughout the country, and the Company's inspectors are now engaged in a survey of the various sites of the shell-fish fisheries and are taking steps to stop the sale of contaminated molluscs.

It might have been thought that sea-water would be prejudicial to the typhoid bacillus, but such does not appear to be the case. The experiments of Dr. Klein and of Prof. Boyce have shown that although the organism does not multiply, it retains its vitality in sea-water for at least three or four weeks. In the infected oyster it lives for two to three weeks or more, and even when washed in pure running sea-water, the infective properties may be retained for several days.

As regards cockles, these are "cooked" before consumption, and thorough cooking would be fatal to the typhoid bacillus. But it seems that the "cooking" of cockles is a very perfunctory process, and consists in simply plunging nets filled with the molluscs into boiling water, so that many might (and obviously do) escape the full action of the heat; actual boiling renders them tough and uneatable.

Legislative enactments and periodical inspections are obviously necessary to protect the public from the risk of infection from sewage-contaminated shell-fish, and should be welcomed by the merchants and their employés whose livelihood depends upon this important industry. So far back as 1894, the value of the oysters alone landed by English dredgers in that year amounted to 84,271*l.*

R. T. HEWLETT.

MR. MARCONI AND THE POST OFFICE.

THE fact that the message from the King to President Roosevelt, in reply to the latter's wireless telegram of greeting, had to be sent to America by cable occasioned at the time much comment and correspondence in the daily papers on the attitude of the Post Office towards Mr. Marconi; the subject cropped up again last week on the return of Mr. Marconi to this country after his successful expedition to America. There is some little difficulty in ascertaining the real state of the case, as two or three different explanations have been put forward in the papers, but the truth of the matter seems to be precisely what we stated in our notes columns four weeks ago. In an interview with a representative of the *Daily Express*, Mr. Marconi made the following statements:—

"We asked the Post Office authorities whether they would allow us to connect our station at Poldhu by wire with Mullion—at our own expense, mind you—but they refused absolutely and entirely."

"The message (that from the King) was not received at our offices until after Mullion Post Office had closed for the night, and one cannot very well keep a King's message